The ghost solid methods for the elastic-plastic solid-solid interface

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Abstract

Original and modified variants of the Ghost Solid Method (GSM) are proposed for application to the boundary conditions at the solid-solid interface of isotropic elastic-plastic materials, in a Lagrangian framework. The methods are discussed for one dimensional as well as two dimensional settings with slip and no-slip conditions. It is shown, in the presence of the wave propagation through the solid-solid mediums, the original GSM can lead to non-physical oscillations in the solution. A scheme for prediction of these non-physical oscillations at the interface is also introduced. The other two variants of GSM proposed, however, can remove the non-physical oscillations that may rise at the interface. Numerous numerical examples in one and two-dimensional settings are provided attesting to the viability and effectiveness of the GSM for treating wave propagation at the solid-solid interface.